

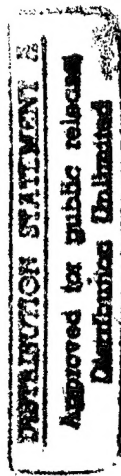
Advanced Battlespace Information System (ABIS)

Task Force Report

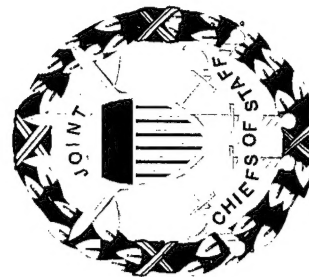
Volume I

Executive Summary

Director of Command, Control,
Communications, and Computers
(Joint Staff)



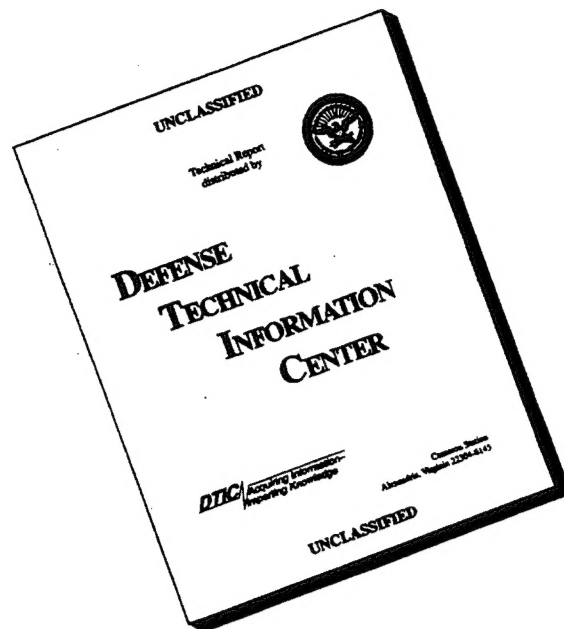
Director, Defense Research
and Engineering
(OSD)



19960924 000

May 1996

DISCLAIMER NOTICE



**THIS DOCUMENT IS BEST
QUALITY AVAILABLE. THE
COPY FURNISHED TO DTIC
CONTAINED A SIGNIFICANT
NUMBER OF PAGES WHICH DO
NOT REPRODUCE LEGIBLY.**

Advanced Battlespace Information System (ABIS)

Task Force Report

Volume I

Executive Summary

May 1996

DTIC QUALITY INSPECTED 2


A Message From the Sponsors of the ABIS Task Force


We chartered this Task Force on the Advanced Battlespace Information System (ABIS) to explore how emerging information technologies could be used to provide the warfighter with significant new capabilities as articulated by the Chairman, Joint Chiefs of Staff (CJCS) in his recently published Joint Vision 2010. Success in future combat relies heavily upon our ability to rapidly acquire, disseminate and utilize knowledge of the three-dimensional battlespace at all echelons by means of a global information system with assured services. Joint Vision 2010 describes how advanced information concepts, like those envisioned in this ABIS study, can materially enhance the effectiveness of maneuver, strike, protection, and logistics as well as provide a new dimension to combat power by exploiting information superiority as a force enhancer and as a weapon itself. The potential of an integrated information architecture is so great that many speak of it as the basis for a revolution in military affairs.

To best explore these new concepts and capabilities we commissioned an ABIS Task Force, composed of operators and technologists, to consider three aspects of the warfighting environment: battlespace management, sensor-to-shooter interoperability, and requirements for a common, supporting information architecture. The expertise and insights of the two communities proved to be complementary, and their collaboration essential. The resulting ABIS study defines a set of operational capabilities required by the warfighter and the corresponding enabling technologies needed to realize these capabilities. It is thought provoking and visionary, and both communities now have a clearer idea of what needs to be done to achieve this vision.

On the operational side, we have taken action to move toward the joint operational architecture of the future. On the technology side, working with the Joint Staff, we have produced the Joint Warfighting Science and Technology Plan, which provides a roadmap for developing technologies needed to meet the demands of future warfighters. We hope to continue this multi-disciplinary, interactive and iterative dialogue between operators and technologists in order to ensure the right technologies are advanced and transitioned, as quickly as possible, to maintain the U.S. military and national leadership throughout the world.

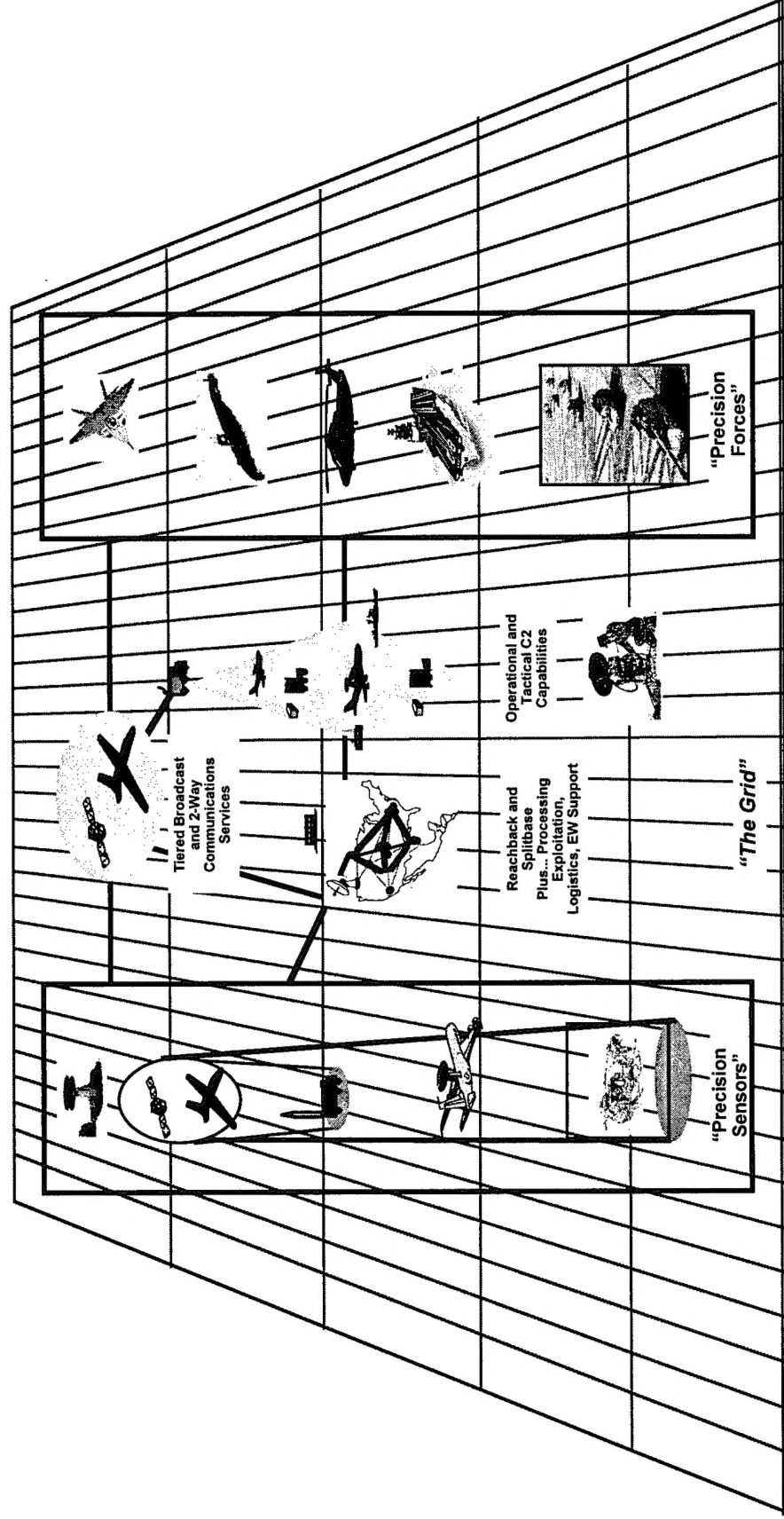
There are three fundamental challenges involved in proceeding: (1) identifying changes in command and control and information processes and procedures necessary to realize the new operational concepts identified in the ABIS study and Joint Vision 2010; (2) determining the associated functional capabilities that can and should be realistically supported by technology; and, (3) developing the most promising technologies needed to develop these new functional capabilities. This ABIS study charts a course forward to meet these challenges. We commend it to you for consideration.


Anita K. Jones
Director of Defense Research and
Engineering


Arthur Cebrowski, Vice Admiral, USN
Director for Command, Control,
Communications and Computer Systems

What is ABIS?

A Federation of Systems That Forms an Underlying Grid of Flexible, Shared, and Assured Information Services and Provides Advanced Capabilities in Support of New Command and Control and Force Employment Concepts.



What is ABIS?

The Advanced Battlespace Information System is a set of underlying information services, technologies, and tools that enable us to achieve the broad operational warfighting capabilities described in Joint Vision 2010. Visualized as a collection of distributed data and applications, integrated through a grid of supporting services, ABIS acquires, processes, and delivers information, as needed, to enhance decision making at all echelons involved in operational functions such as sensor-to-shooter correlation, real-time battle management, and multi-dimensional battlespace awareness.

ABIS is not a new program to develop a worldwide information system. Rather, the ABIS Task Force produced a guiding vision to focus operational and research and development efforts toward a common end. The ABIS is the future global system-of-systems. It has a supporting information architecture shared by the many federated, heterogeneous systems and services that are elements of the ABIS. It allows warfighters, at all echelons, to (1) rapidly acquire, manage, exchange, and understand the massive amount of information relevant to the situation; and, (2) respond and adapt, better than any adversary, to war's dynamics, uncertainties, and ambiguities.

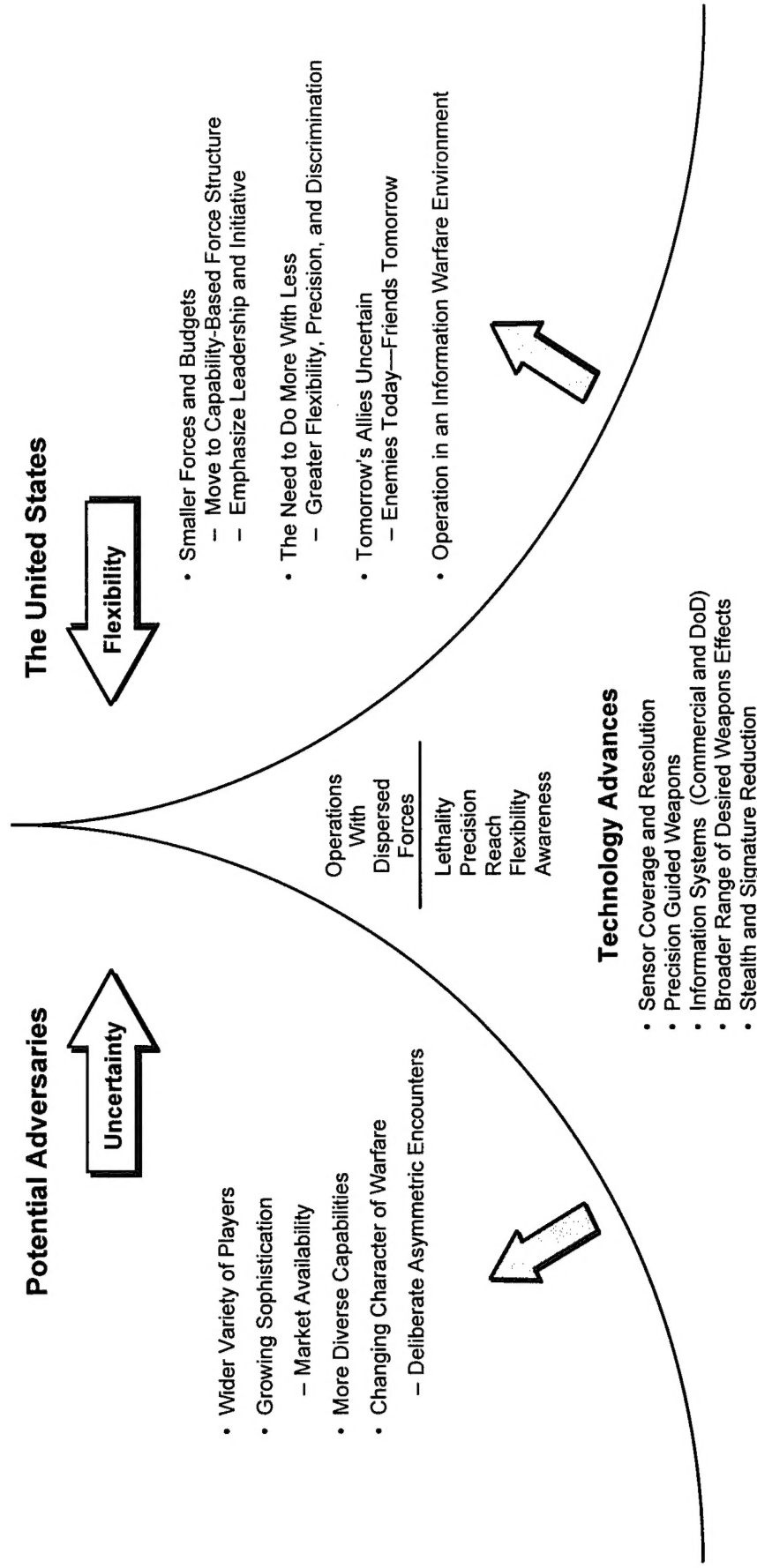
Throughout history, technological innovation has profoundly affected military concepts and doctrine, offering significant advantage to the nation that recognized and leveraged the opportunities created by innovation. The current revolution in military affairs, which has accelerated since the end of the Cold War, is being driven by important changes — particularly the emergence of information technology as a commercial and social force. Knowledge-based systems are evolving at a rapid rate, affecting all forms of competition and national security. To keep up with this rapid innovation and ensure that U.S. forces have technological capabilities that match or exceed those of the enemy, new products (both commercial and military), services, and technologies must be inserted properly to evolve from the patchwork C4I systems of today.

The United States has an opportunity to capitalize on its expertise in developing and applying advanced information technologies by leading the global shift to a new type of information-based warfare that emphasizes delivery of comprehensive knowledge to warfighters at the tactical level. This differs from current practices that focus mainly on providing support at the strategic and national levels. The ABIS vision focuses on using information technology to provide warfighters the knowledge that will permit them to employ forces and mass effects in revolutionary new ways to ensure U.S. military supremacy into the 21st century.

The ABIS study methodology of mapping advanced technology to operational needs seeks to provide an orderly progression from the current stovepipe systems to meet the challenges of Joint Vision 2010. As systems continue to evolve, information technology becomes the enabler that allows interoperability, decentralization, restructuring, and adaptation to new situations, capabilities, and procedures. The challenge is to get the right information in a useable form into the hands of the warfighter in a manner that allows for faster and more accurate situational assessment and response than the enemy is capable of producing.

The Future National Security Environment

An Era of Dynamic Changes, Constrained Resources, and Widely Varied and Uncertain Adversaries Demands Greater Flexibility, Discrimination, and Responsiveness



Capitalizing Quickly on Emerging Technology To Develop New Operational Capabilities Is Key

The Future National Security Environment

U.S. forces will face major challenges in the future national security environment, which will be characterized by change and uncertainty. Our forces will have to deal with a broader range of sophisticated adversaries—often more than one simultaneously in geographically separated locales. In addition, we will have to maintain security with a smaller force structure as dictated by current budget reductions. Maintaining military supremacy in this global context requires a capability-based force structure that can be applied with flexibility, precision, and discrimination, as well as an increased emphasis on leadership and initiative.

This challenge will be met in the context of an ongoing revolution in military affairs for which technological advancement is one of the major drivers—leading to significant improvement in battlespace awareness, reach, precision, and lethality and dictating greater dispersal of forces to ensure their survivability. These trends, combined with additional improvements in information systems, will form the foundation for knowledge-based warfare. They will also allow the U.S. to be more effective with a smaller force.

Because much of the enabling technology is proliferated throughout the world, our potential adversaries are increasing their level of sophistication and will also participate in the revolution in military affairs. It is crucial that the United States be able to rapidly assimilate emerging technologies as soon as they become available. This includes developing new operational concepts, tactics, and organizations to maintain worldwide military leadership.

Joint Vision 2010:

Emerging Operational Concepts

The Lens of Information Superiority

- Integrates and Amplifies Four new Operational Concepts:

Enables New Operational Capabilities:

- Self-Synchronizing Forces
- Increased Speed of Command
- C4ISR Matched to Combat Power
- Decentralized Empowerment
- Enable Alternative Command Structures and Procedures
- Self Adapting and Learning Organizations



Joint Vision 2010

Joint Vision 2010 focuses on achieving dominance across the range of military operations through the application of new operational concepts. It describes how information superiority will enable us increasingly to realize the effects of mass with less need to actually gather those forces than in the past. Concentrating combat power decisively and with precision at the proper time and place will achieve the desired massed effects. Common across these new concepts is the need for control over information throughout the battlespace. Information superiority is a lens that both focuses and enhances the four key operational concepts of:

- Dominant maneuver
- Precision engagement
- Focused logistics
- Full-dimensional protection.

Dominant maneuver is the multidimensional application of dispersed information, engagement, and mobility capabilities in a sustained and synchronized way to control the battlespace and attack enemy centers of gravity to achieve a decisive advantage. Precision engagement ties together high-fidelity target acquisition, prioritized requirements, and command and control of joint forces to engage the adversary, assess our level of effect, and retain the flexibility to reengage with precision when required. Focused logistics relies on the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to directly deliver tailored logistics packages at all levels of operations. Full-dimensional protection, using both active and passive measures, is based on control of the battlespace to ensure that our forces can maintain freedom of action during deployment, maneuver, and engagement while providing multilayered defenses for our forces and facilities at all levels. The synergy of these four concepts will enable the U.S. to dominate the full range of military operations.

In implementing these advanced operational concepts, emphasis will be placed on empowered leadership and initiative, rapid global power projection, maintaining widely dispersed forces with a capability for rapidly achieving mass effects, and the widespread and enhanced use of information and information technologies.

The concept of information superiority is a key element for many other concepts. It emphasizes multidimensional awareness and assessment and an ability to execute friendly operations before an adversary can effectively respond. Concurrently, it stresses protection of our own information capabilities as well as the ability to degrade our adversary's use of his information capabilities. Being able to integrate advanced information technology into an operational system is a key element in providing an order of magnitude improvement in our ability to robustly plan, execute, and achieve full-spectrum dominance.

The ABIS Task Force

A Partnership Between the Director of Defense Research and Engineering (OSD) and the Director for Command, Control, Communications, and Computer Systems (Joint Staff).

Goals	<ul style="list-style-type: none"> • Ensure That the S&T Program for C4I Systems Is Aligned With Joint Vision 2010 • Develop a Strategic Framework for Key C4I System Architectural, Planning, and Programmatic Efforts
Objectives	<ul style="list-style-type: none"> • Identify Important New Operational Command and Control Capabilities and Enabling Technology Initiatives for an ABIS Construct • Identify Follow-on Actions Needed To Ensure the Timely Evolution of ABIS
Scope	<ul style="list-style-type: none"> • Future Major Regional and Lesser Regional Conflicts • Focus on Precision Application of Force in Time and Space • Advanced C4I System Concepts and Technology (2000 to 2010)
Format	<ul style="list-style-type: none"> • Executive Panel: DDR&E and Director, J-6, Joint Staff • DoD Review Group: Senior Representatives From More Than 30 Organizations • Study Leaders: Dr. D. Signori*, CAPT A. Heisig, Mr. E. Brady • Three Working Groups <ul style="list-style-type: none"> – Battle Management (Co-Chairs: Col R. Fly, Mr. D. Eddington) – Sensor-to-Shooter (Co-Chairs: CAPT S. Soules, Dr. B. Deal) – Grid Capabilities (Co-Chairs: Col S. Dalrymple, Dr. H. Frank) • Two Off-Site Meetings (September 95, February 96); and a Final Report in May 1996

*Executive Secretary of the ABIS Task Force, and Director of the Integration Team

The ABIS Task Force

The basic purpose of the ABIS Task Force was to better align the science and technology program with the emerging Joint Vision 2010. The Task Force sought to develop elements of a C4I strategic framework that could guide key planning, architecture, and programmatic efforts and ultimately shape doctrine and training development. The ABIS Task Force was established as an initial step in forming a partnership between the Director of Defense Research and Engineering (OSD) and the Director for Command, Control, Communications, and Computer Systems (Joint Staff).

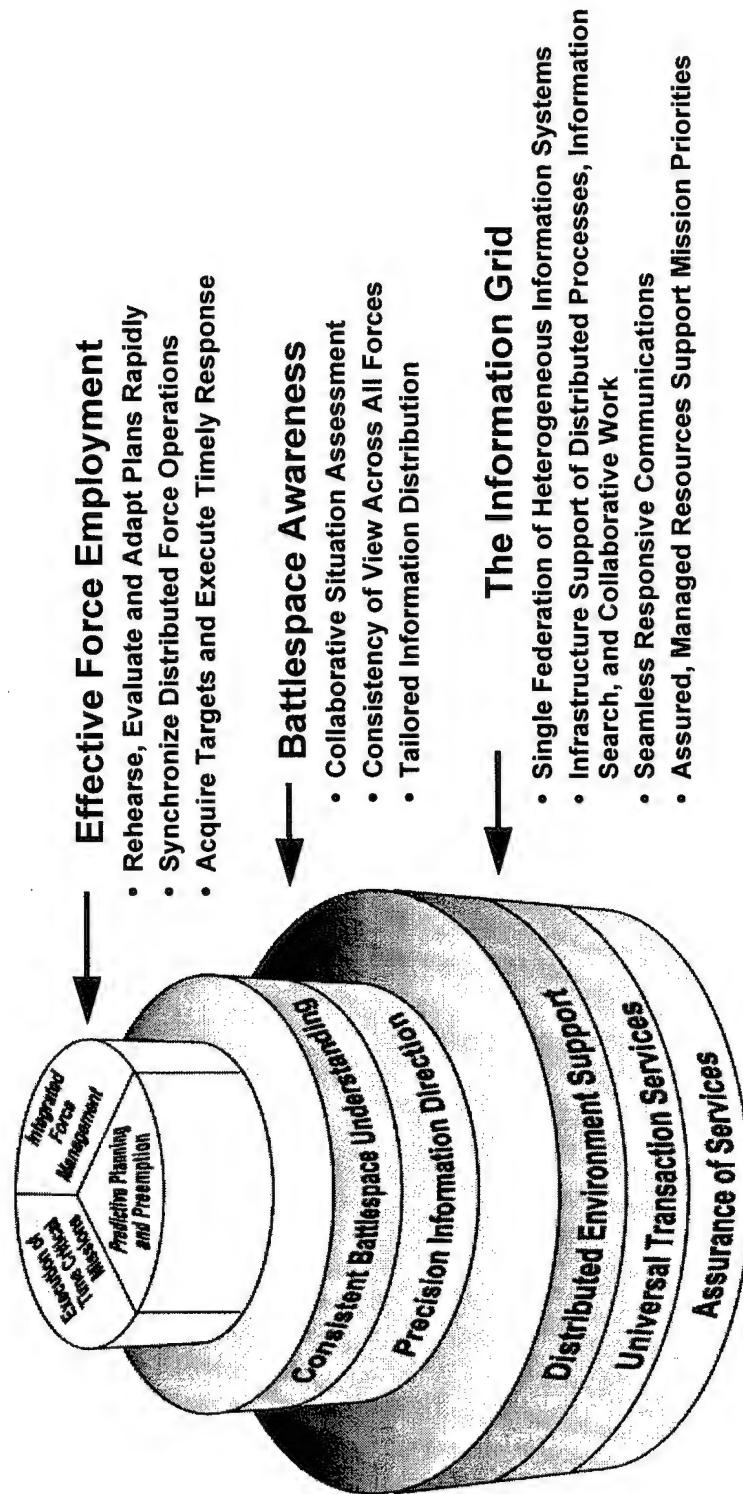
Initially, the Task Force was asked to identify important operational capabilities and needed technology initiatives for an advanced battlespace information system. During the course of the effort, the task was expanded to include identifying follow-on actions that are needed to ensure the timely evolution and fielding of new operational capabilities.

The Task Force focused on precision force operations (dominant maneuver, precision engagement and full-dimension protection) in both Major Regional Conflicts and Lesser Regional Conflicts. The C4I portion of the system-of-systems was the focal point (i.e., new concepts and technology for sensors and weapons were not included) and advanced concepts and technology that could result in fieldable capabilities by 2000 to 2010. The Task Force did not seek to be comprehensive but rather to focus on defining a set of important capabilities derived from an understanding of the future operational context and to develop the audit trail to critical technologies and needed operational demonstrations. Funding was not considered.

Composed of three Working Groups (Battle Management, Sensor-to-Shooter, and Grid Capabilities), the ABIS Task Force had DoD-wide representation and an extensive oversight, review, and integration process. Ensuring strong representation from the operational community was emphasized. Off-site meetings, at the beginning and end, were used to ensure even broader coordination and participation by inviting additional participants.

ABIS Capability Framework

The ABIS Capability Framework Has Three Tiers: Upper Tiers
Rely on Services Provided by Lower Tiers



ABIS Capability Framework

The Task Force identified a set of operational capabilities that ABIS must provide to meet the spectrum of challenges facing the U.S. in the 21st Century. This set of capabilities forms a framework that can be portrayed as three supporting and supported layers: effective force employment, battlespace awareness, and a grid of common information services. Those layers on top of other layers depend on the lower layers for certain services and for inputs.

The foundation of the framework is an information grid, which provides infrastructure and services that establish a supporting information environment. Grid capabilities fall into three general areas: distributed environment support, universal transaction services, and assurance of services. They provide warfighters and their systems the ability to exchange information and work collaboratively unimpeded by differences in connectivity, processing, or interface characteristics. The grid provides generic, robust services to support warfighters as they tailor their information environment to include local and remote organizations, people, and assets.

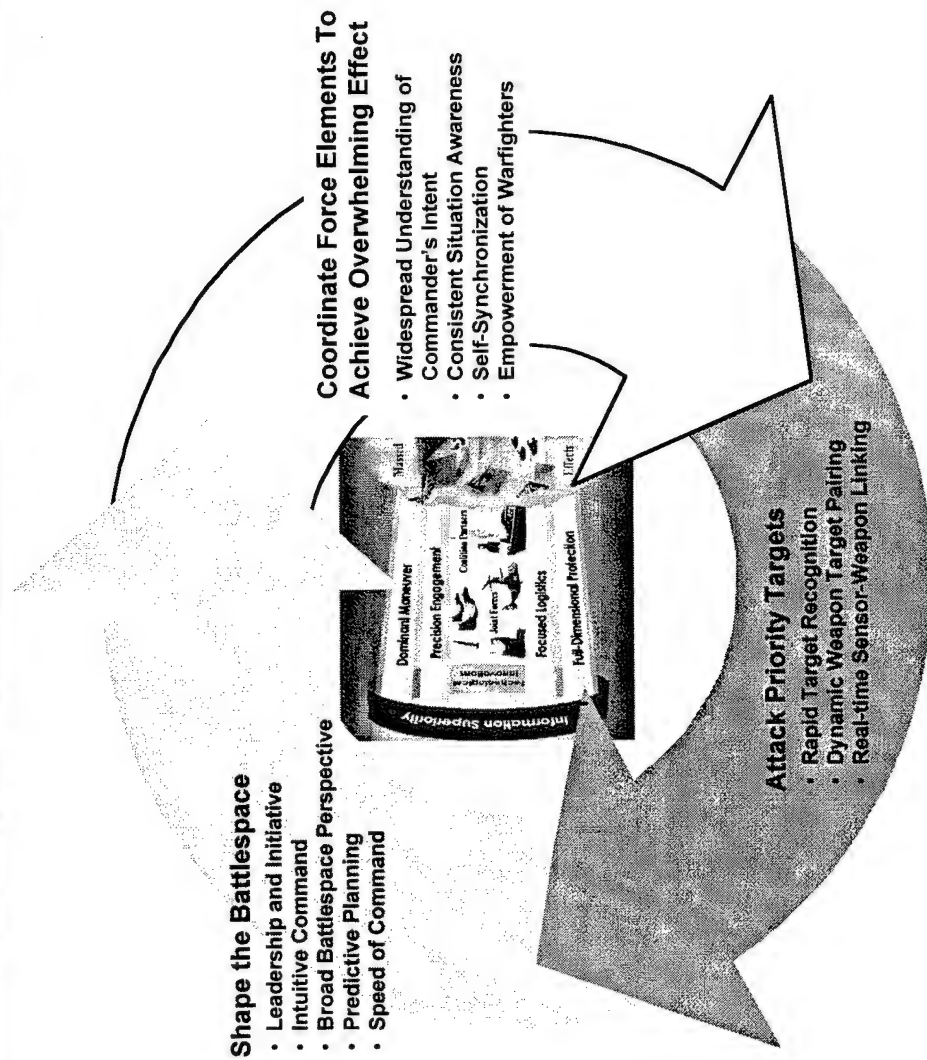
The second tier of the framework is a battlespace awareness capability, which is composed of precision information direction and consistent battlespace understanding. Precision information direction involves the ability to collect, process, and channel information to users in a timely and precise manner. It implies the ability of any warfighter to tailor his environment, to support mission needs, by directing where different kinds of information can flow, when it flows and in what form it appears. Information collection, processing, and dissemination must be dynamically focused on achieving the warfighter's specific mission objectives. Battlespace understanding involves consistent and collaborative assessment of an operational situation and objectives, including assessment of relevant support aspects. Assessors will typically be distributed across multiple locations, and will not need the raw information, but will need information in the form conducive to the task at hand.

Effective force employment, the third level of capability, depends upon the existence of battlespace awareness and grid capabilities and interacts with both. It has many interactive parts, three of which were developed by the ABIS Task Force: predictive planning and preemption, integrated force management, and execution of time critical missions. Predictive planning and preemption allows our own forces to preempt rather than react, to rehearse and evaluate possible futures, and adapt plans rapidly even during execution. Integrated force management is supported through the shared use of knowledge. Linked staffs, warfighters, and automated processes manage dispersed forces and the synchronous execution of missions. Execution of time critical missions is the capability to seize opportunities to acquire targets and to execute attack missions rapidly. This includes sensor tasking, weapons assignment, and dynamic replanning.

The Task Force had a deliberately narrow focus on force employment. A broader view - for example to include logistics - would result in additional mission functions (other slices of the "pie").

New Force Employment Concepts Enabled by Information Superiority

Information Superiority Will Permit Commanders To Control and Shape the Pace and Phasing of Battle by Rapidly Integrating and Synchronizing Dispersed Forces to Mass Effects at the Right Place and Time.



New Force Employment Concepts Enabled by Information Superiority

Information superiority enables new operational concepts for force employment. These concepts include self-synchronizing forces; accelerated speed of command; agile, adaptable organizations; empowered tactical decisions at the lowest levels; and focus on combined and massed effect as opposed to focus on management of seams between forces.

Information superiority ensures that friendly forces have a superior awareness and understanding of the current and projected situation, as well as the commander's intent, and can deny similar awareness and understanding to the enemy. It also implies that friendly forces can better accommodate uncertainty by applying both knowledge and judgment in a more effective way.

Such a capability provides commanders at all levels a broader perspective of the battlespace, allowing them to be proactive in applying force at the right time and at the right place to shape the battlespace, control the pace and intensity of engagements, and operate within the cycle time of the adversary. Shared perception and common understanding of the situation and the commander's intent across dispersed force elements facilitate synchronization and responsiveness to changing situations and coordination, or self-synchronization, across the entire force to achieve overwhelming effect. The result is increased speed of command that will be of critical importance in determining combat outcome.

Leadership, empowerment, and initiative of commanders and individual warfighters are facilitated by providing our forces the ability to quickly visualize changes in the battlespace. Such visualization can be enhanced by assisting warfighters in the use of both their experience and intuition to fill in gaps in collected information, and to understand the true implications of these changes by acquiring and using superior knowledge of the situation.

Finally, the robust ability to rapidly detect, recognize, and prioritize targets; assign forces and weapons; and support attack in real time translates into an ability to attack high-value targets and centers of gravity while protecting our own forces throughout the battlespace.

New Command and Control Concepts

**New Operational Concepts Require a Flexible, Agile, Distributed Command Structure;
With a Capability for Continual Proactive Planning and Empowered Execution.**

- Leadership Supported by a Dynamic Blend of Command Approaches and Supporting Procedures: i.e., Positive Control, Delegation, by Negation
- Self-Adaptive Learning Organization That Has a Flattened Hierarchy With Agile, Augmented (Distributed Staff) Structure
 - Cross-Functional, Organizational Elements Spawned for Mission/Task Duration
 - Direct “On-Line” Support to Executing Forces
- Continual Concurrent Planning and Execution
 - Each Element Operating on Its Own Cycle Accommodating Inherently Different Operating Rhythms
 - All Tasks Coordinated by Tying to Central Strategy
- Proactive, Dynamic Planning and Near-Real-time Replanning Based on
 - Projecting and Assessing Enemy and Friendly Likely Courses of Action
 - Monitoring and Assessing Degree of Mission Accomplishment
- Initiative Enabled by Empowered Execution, as Appropriate
 - Local Authority Over ISR and Strike Processes
 - Direct Local Access to Necessary Information Independent of Command Structure

New Command and Control Concepts

The new force employment concepts enabled by information superiority require changes in command and control organizations and processes. Existing command and control organizations are strongly segmented along lines that reflect both command hierarchy and the division of functional areas. In the future, it must be possible to rapidly adapt command and control capabilities to changing operational situations. The command and control system of the future must be able to accommodate a mixture of command approaches ranging from tight positive control by direction, to delegation and control by negation. Warfighters must be able to structure their command and control organizations and processes dynamically to suit specific deployments, changing situations, and personal leadership preferences, and to achieve the highest efficiency and effectiveness of command.

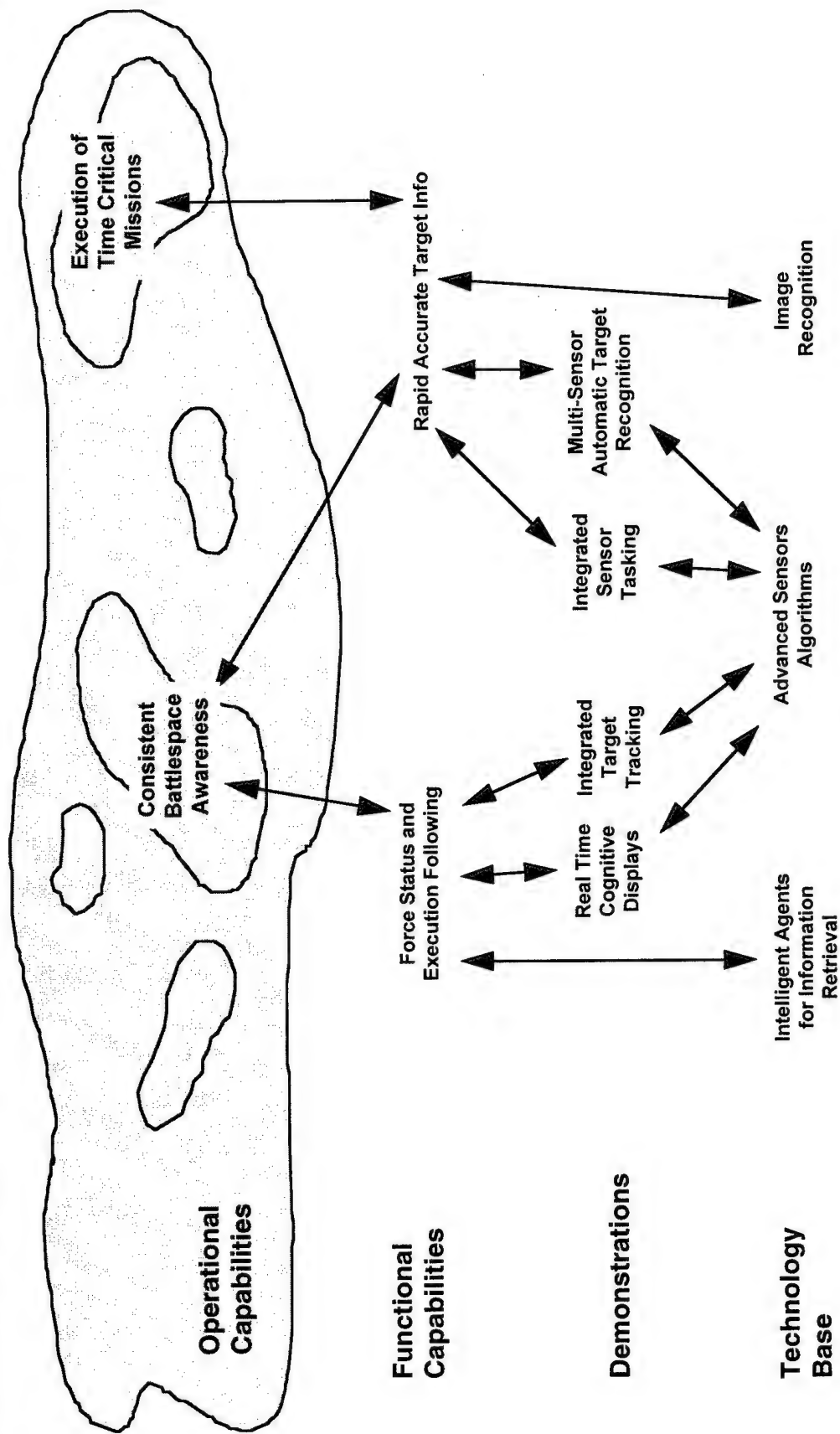
The future command and control organization must be an adaptive organization that can adjust its processes as learning takes place. Information must flow in an orderly way to the element that needs it. Information flow generally is independent of the command hierarchy. Indeed, if delivery of near real-time information is essential, then a more direct path is required. This "flattened" structure would permit on-line support to be provided directly to any element within the force. This approach will also accommodate distributed battle staffs and splitbase operations, and allow the forward "footprint" to be reduced, with more of the staff functions performed out of theater.

Future command and control processes must support proactive, dynamic planning and near real-time planning adjustments based on a timely and accurate understanding of the situation, the current degree of mission accomplishment, and the simulated outcome of alternative futures based on observations, known constraints, and prior experience. The organizing principle of this adaptive process is to support the central strategy in a coherent way. Capabilities of the ABIS will give commanders the flexibility to exercise centralized or decentralized command and control as deemed appropriate for the situation.

The decentralized approach supported by an ABIS architecture enables distributed empowerment. Information superiority, as discussed previously, provides a basis for distributing decision making while maintaining coherence across the force. Commanders responsible for executing specific parts of the plan will have increased authority and information to make decisions and manage resources associated with their tasks. This will include increased delegation of authority over intelligence, surveillance and reconnaissance (ISR) assets and over maneuver, strike, and protection assets. Initiative to make decisions and to execute will be delegated in a way that allows forces to be self-synchronizing and used to maximum effectiveness. Information access and the tools of command must be appropriate to a unit's combat power independent of command echelon.

Mapping Operational Capabilities to Technology Developments

Key Needed Technologies and Demonstrations Have Been Identified for, and Related to, Critical Functions Associated With Important Operational Capabilities Required for the ABIS Construct.



Mapping Operational Capabilities to Technology Developments

The Task Force developed a methodology for explicitly mapping between operational capabilities and supporting technology developments. Beginning with future operations, the Task Force identified 32 critical functional capabilities needed to support desired operational capabilities of the next century. To map from operational to functional capabilities, the Task Force assessed future military missions, potential threats, and combat environments.

When these functional capabilities were determined, it was possible to derive specific technology demonstrations that will enable the warfighter to explore how new technology, and possibly new processes and procedures, support the performance of a given function. Those demonstrations depend on transitioning technology from one or more of the research and development efforts in the DoD and commercial industrial technology bases. Demonstrations then were mapped to supporting technology development efforts.

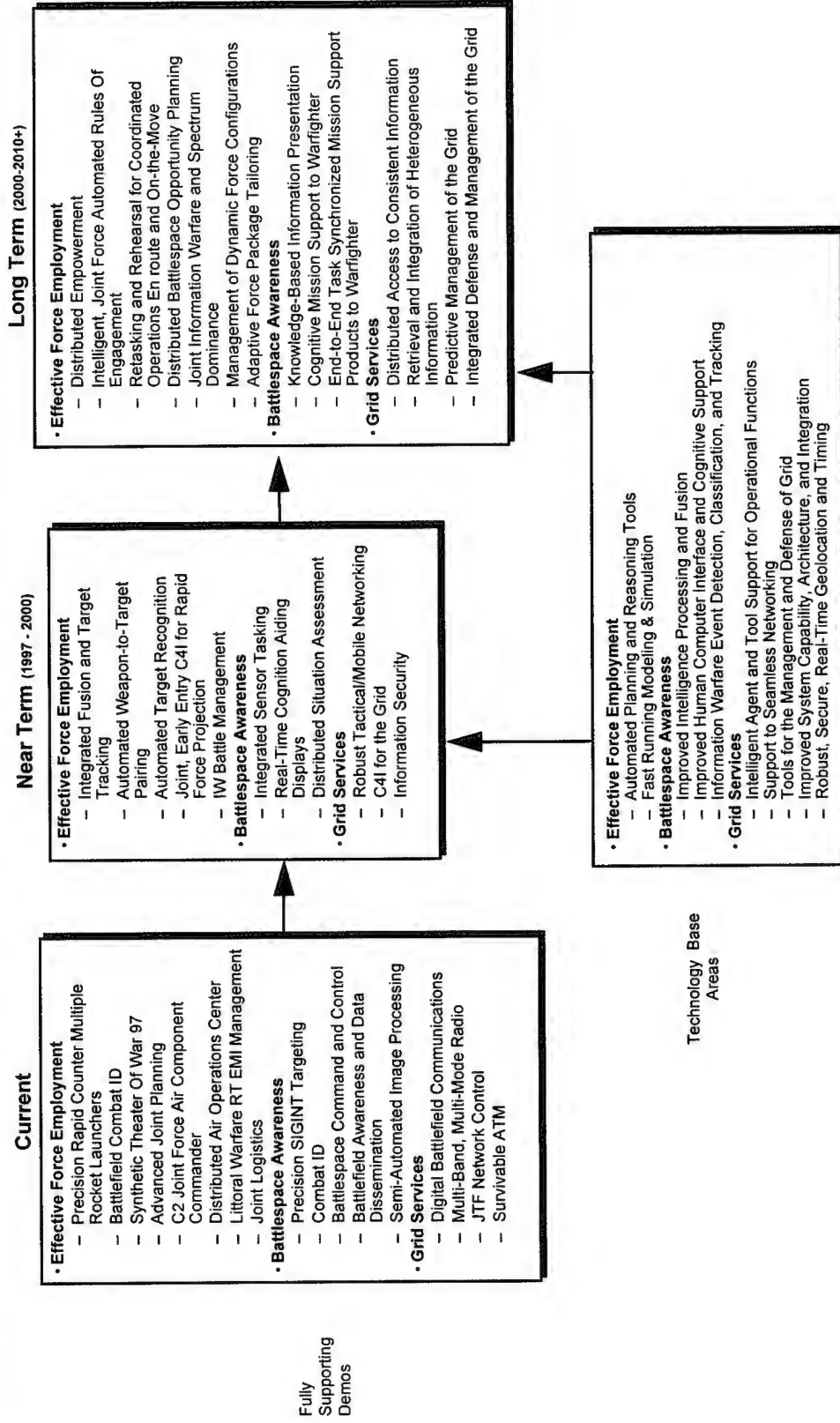
This mapping is symmetrical. It can be used to trace from emerging technologies to prospective new operational concepts and back again. The figure depicts an example of the final mapping. It should be noted that in some cases, multiple technology advances are needed to support a single demonstration. In other cases, the same technology can support multiple demonstrations. Still in other situations, technologies can enable new capabilities without the need for any demonstrations. The ABIS Task Force found that in most instances, the same functional capability supported multiple operational capabilities, and typically one operational capability depended on multiple functional capabilities.

The set of assessed technologies explicitly includes commercial and government information technology advances insofar as known to the Task Force. The Task Force understood that the commercial market drives the rapid advancement of information products, such as processors, memory, displays, communications, architectures, and languages. However, much scientific discovery and long-term maturation of emerging technology on which these products are based are supported by the federal government, including DoD. And, there remains a significant need to develop technologies to meet unique military needs either in performance or timely availability; to understand and apply commercial technology to military problems; and to tailor and integrate commercial technology into military systems. To give one example: the commercial Internet began as the DoD ARPAnet. Though it is one model for the future military information grid, the Internet lacks crucial attributes such as security and resource allocation based on (mission) priority.

Fielding advanced military capabilities as interoperable systems, before they are generally available in the global commercial marketplace, is a crucial element in maintaining military superiority. It is particularly important to demonstrate technology in a military application so that the operator can evaluate utility and consider doctrine changes. The methodology permits the warfighter and technologist to mutually deliberate the relation between technology potential and operational options for the future.

ABIS Technology Roadmap

To Lay the Foundation for ABIS, a Sustained, Concerted Effort Is Needed To Focus Research and Operational Demonstrations in Critical Areas



ABIS Technology Roadmap

The ABIS of the future depends on advanced information technologies—from microelectronics to software. The United States has an advantage in achieving the ABIS vision because it leads the world in both technology and economic market dominance in many of these technologies. Realizing the ABIS vision requires a sustained investment in the further development of a broad base of information technologies as well as the demonstration of military systems that support the functional capabilities operators require. Harnessing technology to sustain military information superiority is a continuing competition. Meaningful capabilities can be realized and incrementally enhanced over time.

The ABIS Task Force developed a technology roadmap to depict continued technology developments and incremental demonstrations. A rich set of demonstrations that support the emergence of the ABIS are currently in progress within the defense technology program.

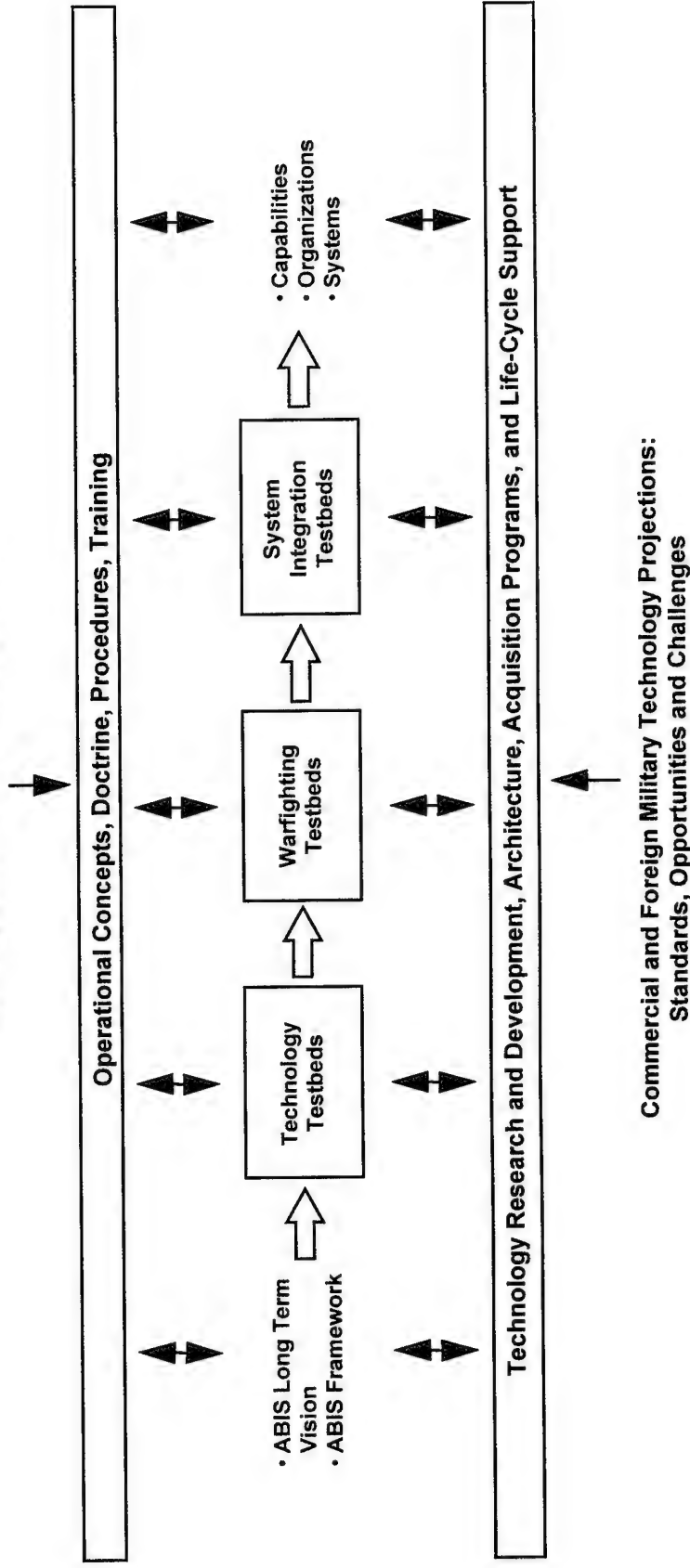
The box labeled Technology Base Areas lists generic technology areas where advances are promising. Incremental and rapid progress will be made over the next several decades in most of these areas. It is these incremental improvements that feed near-term demonstrations (1997-2000) and long-term demonstrations (2000-2010). Long-term demonstrations will not be possible without success in selected technology base efforts. For example, consider Grid Services as one of the three layers of the capability framework. Current demonstrations focus on improving modularity, connectivity, and network management. Near-term demonstrations build on emerging technology and provide enhanced security, defense of the grid from information warfare attack, and management of a grid with hundreds of thousands of connected nodes. Near-term demonstrations also provide predictive management of grid resources to respond to command priorities, better connectivity to lower level tactical units and better interfacing between heterogeneous networks. Long-term demonstrations, on the other hand, will deliver sophisticated automated and continuous assistance to individual users as well as more significant security and defensive features.

The specific technical or operational advantage that an information product or systems application delivers will erode over time. Continual assimilation and enhancement of new technologies, products, and military applications are necessary to retain information superiority and maintain military dominance. Technology will continue to improve rapidly with relatively easy access to individual commercial technology products. Therefore, even relatively unsophisticated adversaries may purchase individual components that are world-class. To retain military superiority, the United States will have to sustain a long-term, focused investment in a broad array of enabling technologies and experiments associated with potentially desirable command and control capabilities. Furthermore, these enhancements will have to be demonstrated and fielded incrementally into the integrated, unified ABIS.

The Implementation of ABIS is an Evolutionary Process

Fielding ABIS Capabilities Requires Incremental Insertion, Adaptation, and Assimilation of New Operational Concepts and Technologies, Guided by a Single Long-Term Vision and a Broad Community of Participants

Continuing Projection of National Security Environment, and
Evolving Decisions on Force Capabilities



The Implementation of ABIS is an Evolutionary Process

Moving from operational concepts and technology programs to actual implementation and user assimilation on a broad scale represents a major challenge. Together, the operational and technical communities are capable of better judgments than either is alone. This was a powerful lesson learned by the ABIS Task Force.

The process illustrated in the figure provides a mechanism to couple the command and control activities of the operational and technology communities. This process is evolutionary and iterative. Today, it is information technology that gives rise to the ABIS vision and framework. ABIS, in turn, will stimulate change in current operational concepts, doctrine, and procedures, which in turn will drive technology to support these changes.

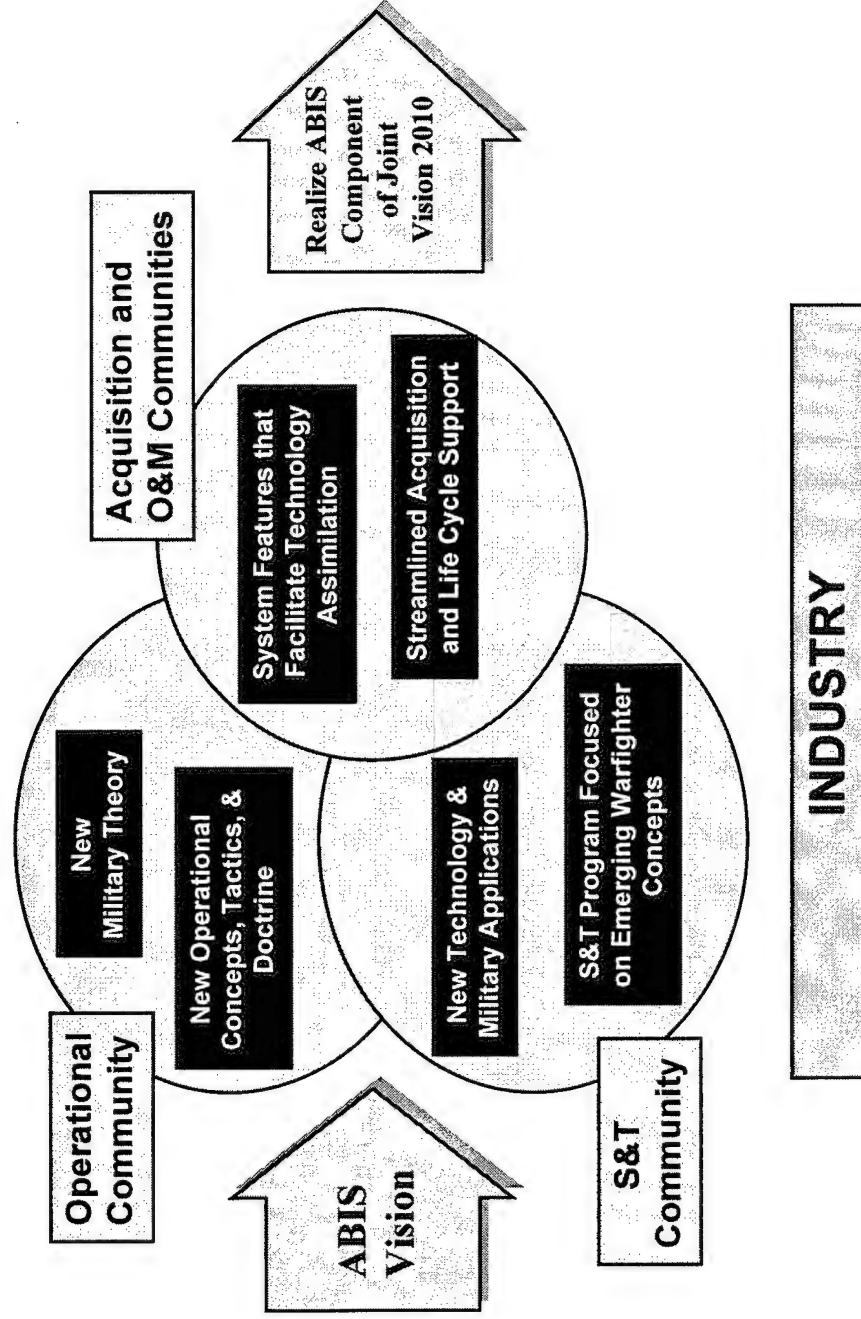
These operational concepts and technologies are shaped, over time, by feedback from testbeds aimed at determining feasibility and operational effectiveness. The testbeds serve as laboratories where operators can experiment with new technology within a simulated, real-world context to determine the extent to which technology will support needed command and control functions and enable new operational concepts. In addition, testbeds can be used to understand systems integration and procedural impacts of inserting new capabilities into evolving systems. These testbeds may be single locations, such as a battle laboratory, or they may be distributed across multiple, electronically linked locations.

The horizontal bars and the arrows at the top and bottom of the figure indicate the continuous interaction of the broad operational and technical communities. The intent is to provide a rapid and smooth transition from concept exploration through system implementation, life cycle support, and operational training within a common ABIS framework. The process must provide for the coordination of planning, architecture, and collaborative integration and evaluation activities; and the rapid incorporation of incremental capability packages into system acquisition, life-cycle support, and training programs.

This process implies a strong integration of activities among organizations on both the operational and technology sides of the DoD. On the technology side, the defense research and engineering community will have to work closely with acquisition organizations. On the operational side, advanced concepts and doctrine development will have to be matched by education and training, and reinforced using simulators and exercises to assimilate the new capabilities into the operational forces. The ABIS vision and framework provide a focus for these community interactions, as well as for the selection and assimilation of new technology and operational concepts.

Initial Steps Toward the Vision

ABIS has Produced Substantive Near-Term Benefits



Initial Steps Toward the Vision

The ABIS study has produced substantive near-term benefits. It served as the catalyst that stimulated the examination of architectural elements that can be incorporated into a Joint Staff operational architecture to support Joint Vision 2010. There is a sequence of studies that addresses various aspects of that architecture; ABIS is one such study. Because information superiority integrates our sensors, weapons, and forces and thus enables them to be more effective, an advanced information system is a key element in the operational architecture required to achieve the Chairman's Joint Vision 2010.

Results have already been incorporated into Science and Technology planning. In particular, the ABIS Study results appear in the Joint Warfighting Science and Technology Plan which was developed jointly by the Joint Staff and the Office of the Secretary of Defense. That plan identifies the key technologies to support twelve of the highest priority needs approved by the Joint Requirements Oversight Council. The ABIS study specifically addressed three of those objectives: Information Security, Precision Force, and Information Warfare. Furthermore, the planners used the ABIS mapping methodology to identify enabling technologies and the Defense Technology Objectives that would provide the crucial building blocks necessary to achieve these three Joint Warfighting Capability Objectives.

Clearly, new operational concepts and revolutionary technology are not enough. Operators can explore new operational concepts that take advantage of emerging technologies and scientists can explore new technologies that enable new operational concepts. However, new technologies will only find their way into fielded systems -- the systems required to realize the ABIS component of Joint Vision 2010 -- if the DoD is willing and able to streamline the acquisition process and if commercial information products and technologies are injected incrementally into the future Advanced Battlespace Information System as it evolves from our command and control support systems of today.

ABIS Task Force Summary

The Need

An Advanced Battlespace Information System for the 21st Century Is a Major Opportunity.

- Allows the U.S. To Remain Militarily Superior Through the Ongoing Revolution in Military Affairs
- Maximizes the Effectiveness of Investments in Sensors and Weapon Platforms

The Vision

ABIS Will Provide a Significant New Capability.

- A Knowledge-Based C4I System Environment That Facilitates Revolutionary Operational Capability by Enabling Warfighters To Rapidly Acquire and Use All Available Information

The Framework

The ABIS Task Force Identified and Integrated the Key Elements.

- Operational Capabilities for 2010
- Needed Critical C2 Functions
- A Broad System Construct
- Time-Phased Operational and Technical Demonstrations, and Technology Base Programs

The Implementation Strategy

Timely Implementation of ABIS Requires Broad Participation in a New Way of Doing Business.

- Continual Assimilation and Utilization of Advanced Information Technology
- Concurrent Advances in Force Employment, and Command and Control Concepts
- Increased Focus and Coordination Within the Operational, Doctrine and Training, Science and Technology, and Acquisition and O&M Communities
- A Process That Emphasizes the Coordination of Planning, Architecture, and a Collaborative Integration and Evaluation Environment, With Rapid Incorporation Into System Acquisition, O&M and Training Programs.

ABIS Task Force Summary

Operational application of information technology will be key to U.S. military strategy as we enter the 21st century. Joint Vision 2010 recognizes this and emphasizes the broad use of advanced information technologies to significantly improve traditional military capabilities. Joint Vision 2010 also emphasizes protection of our information capabilities and degradation of an adversary's ability to use his own command and control systems (i.e., information warfare). Understanding the implications of this vision and identifying needed capabilities and enabling programs are challenging tasks.

The key product of the Task Force is a strategic capability framework for the Advanced Battlespace Information System. It identifies operational capabilities needed to achieve the objectives of Joint Vision 2010, maps them to critical command and control functions, and then to technologies that enable performance of those needed functions. The ABIS framework also outlines a broad system construct that follows the principles of a federation. The federated system would provide warfighters with a robust, flexible, knowledge-based environment of assured information and communication services. Achieving the ABIS requires the continual integration and use of rapidly advancing information technologies as a key element in maintaining global military superiority. The ABIS framework also provides a guide for sustained investment in a broad set of identified enabling information technologies coupled with a time-phased set of specific operational and technical demonstrations.

Achieving timely advances in combat power in the field requires a number of DoD functional organizations to interact in accordance with the long-term ABIS vision and framework. The Task Force outlined a strategy for achieving this. The strategy emphasizes the interaction of users, concept developers, technologists, and system developers in a set of experiments and demonstrations within a network of advanced technology testbeds. This testbed environment is necessary to increase and accelerate the coordination between advances in force employment and command and control concepts; doctrine and training; science and technology; and system acquisition and life-cycle support activities. Important new initiatives in DoD command and control planning, architecture, and testbeds are underway. These initiatives need to be integrated and extended to include a broader range of participants. In addition, much work remains to be done to strengthen these mechanisms and make them a part of the formal DoD organization and acquisition processes. This effort must explicitly improve the process for integrating system components based on new technology into evolving systems, and evaluate the contribution to operational effectiveness attained by enhancing specific operational capability threads, as opposed to upgrading an entire system.

The partnership between the operational and technical communities initiated by the ABIS Task Force must not only continue but also expand and be strengthened by including others in the DoD and other agencies necessary to implement this important part of Joint Vision 2010.

What To Read For A Better Understanding Of ABIS

This is Volume I, the Executive Summary, of the *Final Report of the Advanced Battlespace Information System (ABIS) Task Force*. The entire Final Report is organized into six volumes:

- I. Executive Summary
- II. Major Results
- III. Battle Management Working Group Report
- IV. Sensor-to-Shooter Working Group Report
- V. Grid Capabilities Working Group Report
- VI. Supporting Annexes

Volume I, the Executive Summary, provides an overview of the ABIS Task Force's work and results. Volume II integrates the results of the three working groups into an overall context and discusses key products, conclusions, and recommendations. Volume II should be reviewed for more detail than found in this Executive Summary. Volumes III, IV, and V document the individual Working Groups' results. Volume VI provides supporting information in the form of annexes.